U.S. Department of Justice
Drug Enforcement Administration

www.dea.gov

Microgram Bulletin

Published by:
The Drug Enforcement Administration
Office of Forensic Sciences
Washington, DC 20537

The U.S. Attorney General has determined that the publication of this periodical is necessary in the transaction of the public business required by the Department of Justice. Information, instruction, and disclaimers are published in the January issues.

- APRIL 2011 -

REQUEST FOR INFORMATION ON SYNTHETIC CATHINONES

The sudden appearance of synthetic cathinones (see list below) on the designer drug market in the United States is of great concern.

- **MDPV** *synonym* 3,4-methylenedioxypyrovalerone
- **Mephedrone** *synonyms* 4-methylmethcathinone, 4-MMC
- **Methylone** *synonyms* 3,4-methylenedioxymethcathinone, MDMC
- **Naphyrone** *synonyms* napthylpyrovalerone, NRG-1
- **4-Fluoromethcathinone** *synonyms* 4-FMC, flephedrone
- **3-Fluoromethcathinone** *synonym* 3-FMC
- **Methedrone** *synonyms* 4-methoxymethcathinone, bk-PMMA, PMMC
- **Butylone** *synonyms* bk-MBDB, beta-keto-N-methylbenzodioxolylpropylamine

Although these substances are new to the United States drug market, they have been popular in Europe since 2007. These substances are falsely marketed as "research chemicals," "plant food," or "bath salts." They are sold at smoke shops, head shops, convenience stores, adult book stores, and gas stations and can also be purchased on the Internet. These substances are manufactured in the form of capsules, tablets, and powders. The packages of these commercial products usually contain the warning "not for human consumption" most likely in an effort to circumvent statutory restrictions for these substances. Some of the products found to contain synthetic cathinones include, but are not limited to: Ivory Wave, Vanilla Sky, Energy 1, Explosion, Meow Meow, Bubbles, and others.

Evidence from law enforcement and poison control centers indicates that the use of these substances appears to be widespread and is growing. The American Association of Poison Control Centers reported that in 2010, poison centers took 298 calls about synthetic cathinones.

As of March 2011, poison control centers have received 1,241 calls relating to these products for this year. These calls were received in poison centers in 47 states and in the District of Columbia. In 2009, the National Forensic Information System (NFLIS) received 14 reports of analyzed seizures from 8 states related to these substances. However, in 2010, there were 290 reports of analyzed seizures from 21 states related to these substances reported to NFLIS. Thirteen states including Alabama, Florida, Hawaii, Idaho, Kentucky, Louisiana, Michigan, Mississippi, North Carolina, North Dakota, Utah, Virginia, and Wyoming have passed laws to control all or many of these synthetic cathinones.

MDPV and mephedrone are psychoactive chemicals that are structurally related to the schedule I stimulants, cathinone, with a ring-bearing substituent group, and methcathinone, respectively. Cathinone derivatives including those which bear ring-group substituents have been reported to induce subjective effects similar to those induced by cocaine, amphetamine, 3,4-methylene-dioxymethamphetamine (MDMA), and methcathinone. MDPV and mephedrone are not scheduled under the Controlled Substances Act (CSA). However, law enforcement cases involving synthetic cathinones can be prosecuted under the Controlled Substances Analogue Enforcement Act if the synthetic cathinone meets the definition of a "controlled substance analogue."

Methylone is psychoactive chemical that is structurally and pharmacologically similar to the schedule I substance MDMA. Methylone is not scheduled under the CSA. Naphyrone, 4-fluoromethcathinone, 3-fluoromethcathinone, methedrone, and butylone are not scheduled under the CSA, but they have been identified by U. S. Drug Courts in drug screens or in the International drug market.

These substances are popular with the youth in urban environments, with males appearing to use synthetic cathinones more than females. The most common routes of administration are inhalation by snorting the powder and ingestion by taking capsules or tablets. The powder can also be injected or swallowed. Abusers report effects occurring a few minutes to 15 minutes after administration, depending on the route of administration, and the effects can last up to 3 hours

The Drug and Chemical Evaluation Section (ODE) of the DEA Office of Diversion Control continues to gather information on the pharmacology, toxicity, and abuse of synthetic cathinones and products containing these substances to support possible scheduling of these substances. ODE would greatly appreciate any information related to law enforcement encounters, drug identification, toxicology reports, medical examiner reports, and abuse related to these synthetic cathinones. This includes, but is not limited to, any information associated with the biological response occurring from episodes, data describing toxic effects from exposure to these substances occurring in humans or animals, toxicology reports, risk assessments, identification of these substances to establish prevalence and trends, and suspicion of poisonings connected to patients or postmortem samples. Information that connects these substances to adverse health effects is of particular interest and would provide valuable assistance in the evaluation of these substances for a federal control action.

Contact Us:

DEA Headquarters
ATTN: Drug and Chemical Evaluation Section (ODE)
8701 Morrissette Drive
Springfield, VA 22152
Phone: (202) 307-7183
Fax: (202) 353-1263
E-mail: ODE@usdoj.gov

SELECTED REFERENCES

[The Selected References section is a compilation of recent publications of presumed interest to forensic chemists. Unless otherwise stated, all listed citations are published in English. Abbreviated mailing address information duplicates that which is provided by the abstracting service. Patents and Proceedings are reported only by their *Chemical Abstracts* citation number.]

1. Becue I, Van Poucke C, Van Peteghem C. **An LC-MS screening method with library identification for the detection of steroids in dietary supplements.** Journal of Mass Spectrometry 2011;46(3):327-335. [Editor's Notes: A new mass spectral library of 88 steroids was developed for LC/MS, along with a fast UPLC/MS method. For the construction of this mass spectral library, three different mass spectra were measured for each steroid, with a sample cone voltage of 30, 60 and 100 V, respectively. This method was then successfully tested on contaminated dietary supplements which had previously been tested by means of a targeted LC-MS/MS method. Overall, the library search was shown to identify the same compounds as the MRM method. Contact: Laboratory of Food Analysis, Ghent University, Ghent 9000, Belgium.]

2. Debrus B, Broseus J, Guillarme D, Lebrun P, Hubert P, Veuthey JL, Esseiva P, Rudaz S. **Innovative methodology to transfer conventional GC-MS heroin profiling to UHPLC-MS/MS.** Analytical and Bioanalytical Chemistry 2010:399(8),2583-2746. [Editor's Notes: Presents title study. Contact: Laboratory of Analytical Chemistry, Department of Pharmacy, CIRM, University of Liege, Liege 4000, Belgium.]

3. Frison G, Gregio M, Zamengo L, Zancanaro F, Frasson S, Sciarrone R. **Gas chromatography/mass spectrometry determination of mephedrone in drug seizures after derivatization with 2,2,2-trichloroethyl chloroformate.** Rapid Communications in Mass Spectrometry 2011;25(2):387-390. [Editor's Notes: Presents title study. Contact: Department of Prevention, Laboratory of Environmental Hygiene and Forensic Toxicology, Azienda ULSS 12 Veneziana, I-30174 Mestre, Veneziana, Italy.]

4. Verkouteren JR, Staymates JL. **Reliability of ion mobility spectrometry for qualitative analysis of complex, multicomponent illicit drug samples.** Forensic Science International 2011:206(1-3):190-196. [Editor's Notes: Ion mobility spectrometry (IMS) has been used for trace analysis of illicit drugs, but it can also provide reliable qualitative analysis of bulk forensic drug items, despite the complexity of these samples. The drug/drug and drug/excipient combinations used in this study represent over 80% of the samples reported in NFLIS. From this set of materials, IMS detection windows were set for eight controlled substances, including methamphetamine, MDMA, cocaine, heroin, fentanyl, hydrocodone, oxycodone, and alprazolam. The reduced mobilities of the eight controlled substances were measured over an extended period of time to determine variability with respect to the size of the detection windows. Uncertainties in reduced mobilities smaller than 0.001 $cm^2\ V^{-1}\ s^{-1}$ were obtained, and detection windows were set to between ±0.003 and ± 0.005 $cm^2\ V^{-1}\ s^{-1}$. Reduced mobilities are instrument and operating condition dependent, and must be determined for each instrument. Peak overlaps are observed in the drug/drug combinations, but at least one controlled substance can be detected in each mixture. Excipient concentrations must be quite high (>75 wt%) in binary

mixtures to interfere with the detection of the controlled substance. IMS can be used to identify many of the excipients, and can detect multiple (for these samples, as many as four) substances in complex samples. Over-the-counter (OTC) tablet medications for cold, flu, and allergy relief can be distinguished from tablets containing controlled substances. Bulk materials, including tablets, are sampled simply by using a fine probe to restrict the amount of material transferred to the IMS substrate. IMS represents a distinct advantage over color tests for field analysis of illicit drugs, except in the case of cannabis/THC samples. Contact: Surface and Microanalysis Division, National Institute of Standards and Technology, Gaithersburg, MD 20899, USA.]

Additional References of Possible Interest:

1. Dresen S, Kneisel S, Weinmann W, Zimmermann R, Auwaerter V. **Development and validation of a liquid chromatography-tandem mass spectrometry method for the quantitation of synthetic cannabinoids of the aminoalkylindole type and methanandamide in serum and its application to forensic samples.** Journal of Mass Spectrometry 2011;46(2):163-171. [Editor's Notes: Presents title study. Contact: Institute of Forensic Medicine, Forensic Toxicology, University Medical Center Freiburg, Freiburg, Germany.]

2. Jiang, G. **Use of UHPLC-MS to determine illicit drugs.** American Laboratory 2010;42(8):40-42. [Editor's Notes: Presents title study. Contact: LC/LC-MS Marketing Department, Thermo Fisher Scientific, San Jose, CA 95134 USA.]

3. Papp A, Csikai J. **Detection and identification of explosives and illicit drugs using neutron based techniques.** Journal of Radioanalytical and Nuclear Chemistry 2011;288(2):363-371. [Editor's Notes: Some methods developed by the Institute of Nuclear Research (ATOMKI) and the Institute of Experimental Physics (IEP) for bulk hydrogen analysis and for the detection and identification of illicit drugs are presented. Advantages and limitations of neutron techniques (reflection, transmission, elastic and inelastic scatterings, leakage spectra and angular yields of Be(d,n), Pu-Be, D-D, D-T and ^{252}Cf neutrons transmitted from thick samples, effects of hidden materials) are discussed. Contact: Institute of Nuclear Research (ATOMKI), Hungarian Academy of Sciences, Debrecen 4001, Hungry.]

4. Zaitsu K, Katagi M, Kamata H, Nakanishi K, Shima N, Kamata T, Nishioka H, Miki A, Tatsuno M, Tsuchihashi H. **Simultaneous analysis of six novel hallucinogenic (tetrahydrobenzodifuranyl)aminoalkanes (FLYs) and (benzodifuranyl) aminoalkanes (DragonFLYs) by GC-MS, LC-MS, and LC-MS-MS.** Forensic Toxicology 2010;28(1):9-18. [Editor's Notes: Presents title study. Contact: Forensic Science Laboratory, Osaka Prefectural Police HQ, 1-3-18 Hommachi, Chuo-ku, Osaka, Japan 541-0053.]

* * * * * * * * * * * * * * * * * * * * * * * * *

THE JOURNAL/TEXTBOOK COLLECTION EXCHANGE

The Journal/Textbook Collection Exchange is a service intended to facilitate the transfer of unwanted journals and textbooks to forensic libraries or other *Microgram* subscribers. The current donations are listed below. The offers are First Come/First Serve (except libraries have preference). There are no charges to the requestor. Please provide a full mailing address in the request.

Analytical Chemistry (Microfilm) 1990; Vol. 62 to 2000; Vol. 72
Arzneimittel Forschung (Microfilm) 1973; Vol. 23 to 1999; Vol. 49
Forensic Science International (Microfilm) 1972; Vol. 1 to 1976; Vol. 8
Forensic Science International (Microfilm) 1983; Vol. 21 to 1996; Vol. 83
Journal of Chromatography (Microfilm) 1958; Vol. 1 to 1993; Vol. 622
Journal of Chromatography A (Microfilm) 1993; Vol. 652 to 2001; Vol. 921
Journal of Chromatography B (Microfilm) 1994; Vol. 652 to 2004; Vol. 813
Journal of Forensic Sciences (Microfilm) 1956; Vol. 1 to 1977; Vol. 22
Journal of Forensic Sciences (Microfilm) 1985; Vol. 30 to 1996; Vol. 41
Journal of Pharmacy and Pharmacology (Microfilm) 1965; Vol. 17 to 1987; Vol. 39
Science (Microfilm) 1998; Vol. 279 to 2004; Vol. 306

All subscribers are encouraged to donate surplus or unwanted items/collections. Reference texts and long runs of forensic/analytical journals are of particular interest; however, even single issues are worthwhile, and may fill a hole in an existing collection. If interested, please consult the *Microgram* website or contact the *Microgram* Editor for further instructions.

* * * * * * * * * * * * * * * * * * * * * * * * *

THE DEA FY 2011 STATE AND LOCAL FORENSIC CHEMISTS SEMINAR SCHEDULE

The FY 2011 schedule for the State and Local Forensic Chemists Seminar is as follows:

June 6-10, 2011
September 12-16, 2011

The school is open only to forensic chemists working for law enforcement agencies. It is intended for chemists who have completed their agency's internal training program and have also been working on the bench for at least one year. There is no tuition charge. The course is held at the Hyatt Place Dulles North Hotel in Sterling, Virginia (near the Washington/Dulles International Airport). A copy of the application form is reproduced on the last page of this issue of *Microgram Bulletin*. Completed applications should be mailed to the Special Testing and Research Laboratory at 22624 Dulles Summit Court, Dulles, VA 20166. For additional information, email DEA-Forensic Chemist Seminar -at- usdoj.gov (replace -at- with @).

* * * * * * * * * * * * * * * * * * * * * * * * *

SCIENTIFIC MEETINGS

Title: 2011 Mid-Atlantic Association of Forensic Scientists Annual Meeting
Sponsoring Organization: Mid-Atlantic Association of Forensic Scientists
Inclusive Dates: May 23-27, 2011
Location: Founder's Inn and Spa (Virginia Beach, VA)
Contact Information: maafsmtg@gmail.com
Website: www.maafs.org

* * * * * * * * * * * * * * * * * * * * * * * * *

DEA State and Local Forensic Chemist Seminar Application

Name: (PRINT NAME EXACTLY AS IT IS TO APPEAR ON CERTIFICATE)	Title:

Employer:

Your Office Mailing Address (include city, state, and zipcode):	Length of Service:

Business Telephone: ( ) -	Business Fax: ( ) -	Date of Application:

Email Address:

Education

College or University	Degree	Major

Please Check Which Techniques or Equipment Are Used in Your Laboratory

	Color Tests		UV
	Column Chromatography		IR
	Microcrystal Tests		CE
	Thin Layer Chromatography		GC/MS
	GC		Other (please specify)
	HPLC		Other (please specify)

Indicate Analytical Problem(s) Nominee Would Like to Have Covered:

Choice of Seminar Dates:
1st Choice: 2nd Choice:

Laboratory Chief/Director:

Printed Name:_____ Signature: _____

Title: _____ Date: _____

Phone: _____